

CLAIMS

1. A method of manufacturing semiconductor devices, comprising the steps of:

5 making a first concavity in a first insulating film on a surface of a substrate;

 burying the first concavity covered with the barrier layer for the purpose of preventing metal diffusion with wiring metal;

 polishing the substrate to remove a part of the metal residing higher

10 than the upper peripheral level of the first concavity so as to leave a first metal layer in the first concavity;

 applying solution of substance tending to be bound to the metal layer onto the surface of the substrate so as to form protection film of the substance on the first metal layer for preventing metal diffusion;

15 forming a second insulating film on the surface of the substrate;

 making a second concavity in the second insulating film in a region above the first metal layer; and

 burying the second concavity covered with the barrier layer with a second wiring metal layer to be connected to the first metal layer.

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2. The method of manufacturing semiconductor devices according to claim 1, wherein the surface of the substrate is washed after the solution of the substance is applied onto the surface of the substrate.

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3. The method of manufacturing semiconductor devices according to claim 1 or claim 2, wherein the solution is solution of organic substance, the solution of the organic substance forming protection film of the organic substance for the purpose of preventing metal diffusion.

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4. The method of manufacturing semiconductor devices according to claim 1 or claim 2, wherein the solution is solution of metallic salt, the solution of the metallic salt forming the protection film of a metal composing the metallic salt for the purpose of preventing metal diffusion.

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5. The method of manufacturing semiconductor devices according to claim 1 or claim 2, wherein the wiring metal is copper.

6. The method of manufacturing semiconductor devices according to
claim 1 or claim 2, further comprising the step of washing the polished
substrate to eliminate particles therefrom, after the step of polishing the
substrate to remove the metal residing higher than the upper peripheral level
5 of the first concavity so as to leave the first metal layer in the first concavity,
and prior to the step of applying the solution of the substance tending to be
bound to the metal layer onto the surface of the substrate so as to form the
protection film of the substance on the first metal layer for preventing metal
diffusion.

10 7. An apparatus for manufacturing semiconductor devices,
comprising:
a carry-in unit where a substrate cassette receiving a substrate is
carried in, the substrate having a metal layer formed in a concavities in a
15 insulating film on the substrates;
a first washing unit where a surface of the substrate is washed;
a processing unit where solution of substance tending to be bound to
the metal layer is applied onto the surface of the substance so as to form
protection film on the surface of the metal layer for preventing metal
20 diffusion; and
a carrying unit where the substrate is unloaded from the substrate
cassette carried in the carry-in unit, and carried among the units from one to
another.

25 8. The apparatus for manufacturing semiconductor devices according
to claim 7, further comprising
a second washing unit where the processed substrate in the processing
unit is washed with a washing liquid; and
a drying unit where the substrate washed therein is dried.

30 9. The apparatus for manufacturing semiconductor devices according
to claim 8, wherein the first washing unit, the processing unit, the second
washing unit, and the drying unit are arranged as a series of processing
vessels, the carrying unit transporting the substrate among the plurality of
35 processing vessels from one to another.

10. The apparatus for manufacturing semiconductor devices

according to any one of claim 7 through claim 9, wherein the metal layer is made of copper.

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